

## CLAIMS:

1. An electrophoretic display device (1) comprising:  
an electrophoretic medium (40) comprising charged particles (8, 9);  
a plurality of picture elements (18);  
electrodes (5, 5') associated with each picture element and arranged to receive  
5 drive signals (Dr); and  
drive means (10) arranged to control the drive signals supplied to the  
electrodes, which drive signals are provided to create a potential difference (VD) across each  
picture element to bring the particles into a position corresponding to image information to be  
displayed, the display device being characterized in that:  
10 said drive means is further arranged to apply a second electric signal (Ne) to  
the electrodes, which second electric signal decreases the ability of said particles to respond  
to the drive signal.
2. The display device (1) according to claim 1, wherein the energy of the second  
15 electric signal (Ne) is controlled by the drive means (10) such that said second signal does  
not drive the particles (8, 9) into an extreme position near the electrodes (5, 5', 6).
3. The display device (1) according to claim 1 or 2, wherein the second electric  
signal (Ne) is superimposed on the drive signal (Dr).  
20
4. The display device (1) according to any one of claims 1-3, wherein the  
superimposed signal (Dr'+Ne') is arranged such that its polarity remains the same for the  
complete duration of the second electric signal (Ne).
- 25 5. The display device (1) according to any one of claims 1-4, wherein the drive  
signal (Dr) is distributed around the second electric signal (Ne).
6. The display device (1) according to any one of claims 1-5, wherein the second  
electric signal (Ne) is applied during the second half of the duration of the drive signal (Dr).

7. The display device (1) according to any one of the preceding claims, wherein the second electric signal (Ne) is applied at the end of the duration of the drive signal (Dr).

5 8. The display device (1) according to any one of the preceding claims, wherein the second electric signal (Ne) comprises a sequence of pulses, in which sequence the polarity of the pulses is alternating.

9. The display device (1) according to claim 8, wherein the energy of a pulse in  
10 the sequence is essentially equal to the energy of any other pulse in said sequence.

10. The display device (1) according to claim 8, wherein the amplitude of the pulses decreases with time.

15 11. The display device (1) according to any one of claims 8-10, wherein the drive means (10) removes any direct current component from the second electric signal (Ne) before applying it to the electrodes (5, 5').

12. A method of controlling gray level transitions in an electrophoretic display  
20 device (1), the method comprising the steps of:

supplying a drive signal (Dr) to display device electrodes (5, 5') associated with each picture element (18) of the display device;

controlling the drive signal supplied to the display device electrodes such that the drive signal provided to each picture element creates a potential difference (VD) across  
25 said picture element to bring charged particles (8, 9) of the display device into a position corresponding to image information to be displayed, the method being characterized in that it comprises the step of:

applying a second electric signal (Ne) to the display device electrodes, which second electric signal decreases the ability of said particles to respond to the drive signal.

30

13. The method according to claim 12, further comprising the step of:

controlling the energy of the second electric signal (Ne) such that said second signal does not drive the particles (8, 9) into an extreme position near the display device electrodes (5, 5', 6).

14. The method according to claim 12 or 13, further comprising the step of:  
superimposing the second electric signal (Ne) on the drive signal (Dr).
- 5 15. The method according to any one of claims 12-14, wherein the superimposed  
signal (Dr'+Ne') is arranged such that its polarity remains the same for the complete duration  
of the second electric signal (Ne).
- 10 16. The method according to any one of claims 12-15, further comprising the step  
of:  
distributing the drive signal (Dr) around the second electric signal (Ne).
- 15 17. The method according to any one of claims 12-16, wherein the second electric  
signal (Ne) is applied during the second half of the duration of the drive signal (Dr).
18. The method according to any one of claims 12-17, wherein the second electric  
signal (Ne) is applied at the end of the duration of the drive signal (Dr).
- 20 19. The method according to any one of claims 12-18, wherein the second electric  
signal (Ne) comprises a sequence of pulses, in which sequence the polarity of the pulses is  
alternating.
- 25 20. The method according to claim 19, wherein the energy of a pulse in the  
sequence is essentially equal to the energy of any other pulse in said sequence.
21. The method according to claim 19, wherein the amplitude of the pulses  
decreases with time.
- 30 22. The method according to any one of claims 19-21, further comprising the step  
of:  
removing any direct current component from the second electric signal (Ne)  
before applying it to the display device electrodes (5, 5').